Decision Support Framework for Placement of BMPs in Urban Watersheds

Fu-hsiung (Dennis) Lai
Environmental Engineer
U.S. EPA Office of Research and Development (ORD), National Risk Management Research Laboratory (NRMRL), Water Supply and Water Resources Division (WSWRD), Urban Watershed Management Branch (UWMB)
(732) 321-6632
lai.dennis@epa.gov

Authors: Fu-hsiung (Dennis) Lai[1], Leslie Shormaker[2], Mow-Soung Cheng[3]
[1]U.S. EPA ORD/NRMRL/WSWRD/UWMB, Edison, NJ
[2]Tetra Tech, Inc., Fairfax, VA
[3]Prince George's County, Largo, MD
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To assist stormwater management professionals in planning for best management practices (BMPs) implementation, the U.S. Environmental Protection Agency (U.S. EPA) initiated research in 2003 to develop a decision support system for placement of BMPs at strategic locations in urban watersheds. This tool will help develop, evaluate, select, and place BMP options based on cost and effectiveness. The tool is called the Integrated Stormwater Management Decision Support Framework (ISMDSF). The ISMDSF, a generic public domain framework, will provide a means for objective analysis of watershed management alternatives among multiple interacting and competing factors. The desired outcome from the ISMDSF application is a thorough, practical, and informative decision-making process considering economic, environmental, and engineering factors. The ISMDSF, targeted to be fully developed and tested in 2007–2008, will be open-coded and eventually released at no charge to the public for national application.

This research started with a systematic review of watershed management needs and issues, current and emerging Geographic Information System (GIS) data management technology, and available watershed and BMPs process simulation models. Then a comprehensive design of the framework and algorithms for process simulation were developed. The ISMDSF has seven key components: framework manager, ArcGIS interface, watershed model, BMP model, optimization model, post-processor, and Microsoft Access database. They are integrated under a common ArcGIS platform. The watershed model predicts flow and pollutant loading for input to BMPs, and the BMP model performs process-based simulation to derive their performance (effectiveness). The ISMDSF will support evaluation of BMP placement at multiple scales from a few city blocks to large watersheds, as well as provide a unified and consistent approach for evaluating the effects of BMP implementation.

This research is being conducted through an extramural contract with Tetra Tech, Fairfax, VA, a leader in watershed and BMP modeling. The project is also in partnership with Prince George's County, MD, as the county permitted their existing process-based BMP model to be used as one component of the ISMDSF. In addition to the existing BMP Model, the ISMDSF will also tap into the ongoing county's project, funded by the U.S. EPA Region 3, to enhance the BMP model

and add a cost-optimization routine for analysis and application of BMP and low-impact development (LID) technologies for minimizing combined sewer overflows in the Anacostia River Watershed in the District of Columbia.